

**Commonwealth of Kentucky  
Division for Air Quality**

**PERMIT APPLICATION SUMMARY FORM**

Completed by: Sukhendu K Majumdar

GENERAL INFORMATION:

Name:	Marathon Petroleum Company, LLC Catlettsburg Refining, LLC.
Address:	P.O. Box 1492 Catlettsburg, KY 41129
Dates application received:	May 5, 2008 and August 19, 2008
SIC/Source description:	2911
Source ID #:	21-019-00004
Source A.I. #:	339
Activity #:	APE20080006/20080007/20080008/20080010/20080011/20080015
Permit number:	V-05-089R2

APPLICATION TYPE/PERMIT ACTIVITY:

<input type="checkbox"/> Initial issuance	<input type="checkbox"/> General permit
<input checked="" type="checkbox"/> Permit modification	<input type="checkbox"/> Conditional major
__Administrative	<input checked="" type="checkbox"/> Title V
__Minor	<input checked="" type="checkbox"/> Synthetic minor
X Significant	<input type="checkbox"/> Operating
<input type="checkbox"/> Permit renewal	<input checked="" type="checkbox"/> Construction/operating

COMPLIANCE SUMMARY:

<input type="checkbox"/> Source is out of compliance	<input type="checkbox"/> Compliance schedule included
<input checked="" type="checkbox"/> Compliance certification signed	

APPLICABLE REQUIREMENTS LIST:

<input type="checkbox"/> NSR	<input checked="" type="checkbox"/> NSPS	<input checked="" type="checkbox"/> SIP
<input type="checkbox"/> PSD	<input checked="" type="checkbox"/> NESHAPS	<input type="checkbox"/> Other
<input type="checkbox"/> Netted out of PSD/NSR	<input checked="" type="checkbox"/> Not major modification per 401 KAR 51:001, 1(116)(b)	

MISCELLANEOUS:

☐ Acid rain source  
☐ Source subject to 112(r)  
☒ Source applied for federally enforceable emissions cap  
☒ Source provided terms for alternative operating scenarios  
☒ Source subject to a MACT standard  
☐ Source requested case-by-case 112(g) or (j) determination  
☐ Application proposes new control technology  
☒ Certified by responsible official  
☒ Diagrams or drawings included  
☐ Confidential business information (CBI) submitted in application  
☐ Pollution Prevention Measures  
☒ Area is non-attainment (list pollutants): Ozone (8- HR), PM 2.5

EMISSIONS SUMMARY:

Pollutant	2007 Actual (tpy)	Potential (tpy)
PM	1436	1847
PM <sub>10</sub>	1436	1847
SO <sub>2</sub>	1656	2164
NO <sub>x</sub>	2327	3601
CO	1212	2360
VOC	12704	13880
Benzene	539	582
Cumene	549	598
Ethylbenzene	1.6	36.6
Methyl Tert-Butly Ether	0	324.0
Naphthalene	3.4	14.0
Toluene	10.1	50.7
Xylenes (Total)	1.7	11.0
Total HAPs	93	502.5

**REVISION: V-05-089 R2:**

A significant revision application to increase the processing rate of Kerosene Desulfurization Unit (KDS) was received by the Division on May 5, 2008. The KDS unit started operation in March 2006 under the operating permit VF-04-001. The permit conditions were later subsumed into Title V permit V-05-089. The unit was originally permitted for a heater heat input capacity of 53.3 mmBtu/hr Higher Heating Value (HHV) and a nominal capacity of 25,000 barrel/day kerosene throughput. The facility has determined that the unit can be operated as built at 34,000 barrel/day and 65 mmBtu/hr HHV. Pursuant to 401 KAR 51:017 (16)(4) and 401 KAR 51:052 (7)(4), the change in processing rate would be a significant revision of the permit due to the change in existing heater duty and heater emission limits imposed in V-05-089 permit. Because the increase in heat input rate for the KDS unit will be achieved solely through the relaxation of the permit conditions with no physical change, the project was reevaluated at the requested higher rates, as if construction had never commenced. From this analysis, the construction of the KDS Unit did not result in a net significant emissions increase pursuant to 401 KAR 51:017 or 401 KAR 51:052, based on the new heater input capacity and kerosene throughput.

A significant revision application to modify and expand the Sulfolane Unit and construction of a barge loading vapor destruction unit (VDU) at the Light Oil Barge Loading Dock was received by the Division on August 19, 2008. Mobile Source Air Toxic (MSAT) Phase 2 rule triggered to modify and expand the Sulfolane Unit to produce 0.62 vol% benzene containing gasoline with averaging, banking and trading beginning January 1, 2011 for refiners. The Sulfolane Unit was designed with a nominal capacity of 25,000 barrels per day and will be expanded to 45,000 barrels per day based on reformat feed. Construction of the project will allow the Catlettsburg Refining, LLC to produce low-benzene containing gasoline as required by US EPA's MSAT Phase 2 final rule on February 9, 2007. At the petrochemical area of the refinery, benzene is used as a feedstock to produce cumene. During the periods of Cumene Unit outages, barge loading of unused benzene will

be required to maintain optimum processing rates of the two reformers. These loading operations will be governed by 40 CFR 61 Subpart BB and required to have vapor controls. A vapor destruction unit (VDU) with an efficiency greater than 98% will be installed.

Applicability of the PSD regulations 401 KAR 51:017 are not triggered for the MSAT Phase II Sulfolane Unit expansion project because no significant net emissions increase will result. The emissions increase calculations include emissions from new and modified emissions units as well as other affected emissions units upstream and downstream of the new and modified equipment.

A minor permit revision application was received by the Division on June 16, 2008 for the corrections of a few text inaccuracies and a few other corrections to the permit V-05-089 R1. These text inaccuracies and corrections are incorporated in the significant revision permit V-05-089 R2.

A minor permit revision application was received by the Division on July 7, 2008 for the revision of the synthetic minor limits to the Boiler Consolidation project. To ensure consistency with the consent decree entered into by CRLLC and the U.S. EPA, CRLLC requesting to revise the permit to include a cap on SO<sub>2</sub> emissions for the three new boilers. The revision to include SO<sub>2</sub> limits has been incorporated in the revised permit V-05-089 R2.

Additional changes to permit V-05-089 R2 were made to include the minor permit revisions applications received by the Division after the first revision of the initial Title V permit. These changes are as follows:

- Final USA EPA consent decree for Heaters: Minor permit revision for the final consent decree agreement signed on February 7, 2008 between US EPA and the source to limit the emissions from FCC charge heater, Sat Gas heater and HPVGO charge heaters.
- Fuel Gas Drum on-line BTU Analyzer: Minor permit revision to install an on-line fuel gas BTU analyzer in one of the fuel gas drum. The on-line fuel gas analyzer would calculate High Heating Value (HHV) of the fuel gas. The HHV would be used to determine the firing duty of the heaters.

### **SOURCE DESCRIPTION:**

Marathon Petroleum Company at the Catlettsburg Refining, LLC (CRLLC) processes petroleum crude oil to produce gasoline, diesel fuel, kerosene, jet fuel and petroleum derivatives such as petrochemicals and lube oil feed stock. Besides the crude oil processing units, the refinery has boilers, sulfur plants, and waste water treatment. Raw crude, refined petroleum products, and intermediates are stored in the storage tanks for distribution and further processing.

The refinery at Catlettsburg uses the Big Sandy River to transport domestic crude oil and product distribution in barges. Besides the river transportation, there are railroad tank cars and truck loading and unloading facilities at different areas of the refinery used for efficient movement of transportation fuels, lube oil feed stock and petrochemicals. Viney Branch transfer racks are provided with a Vapor Recovery Unit (VRU) to absorb volatile organic compounds (VOC) in the activated carbon during loading operation. Activated carbon is regenerated by vacuum by using vacuum pump and the vapor is condensed to recover the hydrocarbon liquid. The vapor recovery

system has an absorption and regeneration cycle. VOCs during solvent loading in the trucks and rail cars uses the Vapor Destruction Unit (VDU) to reduce the air emissions.

The light gases produced during the processing of the crude oil are used by the refinery sweet fuel gas system after being treated with amines. The refinery fuel gas is used for process heaters, steam generating boilers, flares and incinerators.

Amines are regenerated for recycling. Amine regenerator off-gas along with foul water stripper off-gas from the wastewater treatment area, are directed to the sulfur plant. The sulfur plant produces metallic sulfur in the Claus reactors and reduces the sulfur dioxide (SO<sub>2</sub>) emission from refinery. Some of the heaters and boilers at the refinery are provided with low nitrogen oxide (NO<sub>2</sub>) burners to reduce NO<sub>x</sub> emissions to the ambient air.

The refinery has one Fluidized Catalytic Cracking (FCC) unit, two Catalytic Cracking Reformer (CCR) units and one HF Alkylation unit to produce and improve the Research (RON) and Motor (MON) octane for the three grades of gasoline distributed in the pumps.

The CRLLC has a Lube Oil Complex to produce Lube Feed stock. Lube crude is processed in the #5 crude unit, and the lube vacuum unit makes the 100N and 325N waxy distillate. Waxy distillates are further treated in the Furfural Extraction unit and MEK De-waxing units to produce salable lube feed stock.

The CRLLC also manufactures petrochemicals such as cumene, solvents and other products to be further processed in the chemical industry. Some of the aromatics are also produced in the petrochemical area such as benzene, toluene, xylene, and naphthalene. The refinery brings in Coal Tar Light Oil (CTLO) from the coal industry to meet the demand of benzene in the manufacture of cumene. Light liquid from the reformers and distilled liquids from the CTLO are separated in the Sulfolane Unit liquid-liquid extraction process to produce benzene, toluene and xylene.

The refinery has two independent waste water systems: Oily water sewer system and NESHAP regulated waste water system. The NESHAP water is being collected in collection pits through out the refinery process units and pumped to a storage tank. Water from the storage tank before going to the common treatment facility is being treated in the Benzene Recovery Unit (BRU).

In the Title V initial operating permit, the refinery was broken down into nine areas based on the similarity of the process and state air regulations:

1. Transfer Racks: Loading/unloading raw materials and products;
2. Flares;
3. Cooling Towers;
4. Heaters, Boilers and Combustion Devices;
5. Process Units;
6. Storage Vessels;
7. General Wastewater Treatment Area
8. Benzene Wastewater Treatment Area
9. Remediation

**EMISSION AND OPERATING CAPS DESCRIPTION:**

Pursuant to 40 CFR 63.560(b)(2), in order to preclude the applicability of 40 CFR 63 Subpart Y Sections 63.562 (c) and (d), as referenced by 40 CFR 63 Subpart CC Section 63.651(a), the following loading limits shall not be exceeded at the marine tank vessel loading operations:

<b>Product</b>	<b>Loading Limit (million bbl/year)</b>
Gasoline	10
Crude Oil	200

Emissions due to loading materials at the Viney Branch transfer rack shall not exceed 120.9 tons of VOC during any consecutive 12-month period. [To preclude the applicability of 401 KAR 51:017, PSD, for VOC emissions]

Pursuant to 40 CFR 63.560(a)(2), in order to preclude the applicability of 40 CFR 63 Subpart Y Sections 63.562 (b) and (d), as referenced by 40 CFR 63 Subpart CC Section 63.651(a), the following emission limits shall not be exceeded at the marine tank vessel loading operations. Emissions shall be calculated using the methods specified in 40 CFR 63.565(l).

<b>Pollutant</b>	<b>Any consecutive 12-months period Emission Limit (ton/year)</b>
Each Individual HAP	10
All Combined HAP	25

VDU 1-7-B-1 shall control loading emissions from the New Solvent Truck Loading Rack (L004) with a VOC destruction efficiency of at least 98%. [To preclude the applicability of 401 KAR 51:017, PSD, for VOC emissions]

The use of chromium based water treatment chemicals is prohibited [Requirement to preclude applicability of 40 CFR 63, Subpart Q].

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3) and revised in V-05-089]

<b>Affected Units</b>	<b>Maximum Emissions (tons/yr)</b>				
	<b>SO2</b>	<b>NOx</b>	<b>VOC</b>	<b>CO</b>	<b>PM10</b>
H001 (1-002-B-003) No. 2 Crude Charge Heater	14.7	54.8	3.0	46.0	4.2

In addition, heat input to the No. 2 Crude Charge Heater shall not exceed 125.0 mmBtu/hr, HHV based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit S-96-207]

Affected Units	Maximum Emissions (tons/yr)
H042 (1-035-B-003) #1 Cumene Column Reboiler	Nitrogen oxides (NO <sub>x</sub> ) emissions shall not equal or exceed 39 tons/yr

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3) and revised in V-05-089]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H019 (2-026-B-002) No. 4 Vacuum Charge Heater	15.1	39.9	3.1	47.1	4.3
H020 (2-023-B-006) No. 4 Vacuum Charge Heater	18.8	97.8	3.8	58.7	5.3

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3)]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub> (consent limit)	VOC	CO	PM <sub>10</sub>
H021 (2-023-B-003) No. 3 Crude Charge Heater	20.8	54.3 (43.0)	4.65	65.2	5.9
H022 (2-023-B-004) No. 3 Crude Charge Heater	20.8	54.3 (43.0)	4.65	65.2	5.9

In addition, heat input to the No. 3 Crude Charge Heaters shall not exceed 177.1 mmBtu/hr, each, based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3) and revised in V-05-089 R2]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub> (consent limit)	VOC	CO	PM <sub>10</sub>
H023 (2-030-B-001) Sat Gas Plant Heater	21.0	54.6 (39.0)	4.3	65.6	5.9

In addition, heat input to the Sat Gas Plant Heater shall not exceed 178.2 mmBtu/hr HHV, based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3)]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H028 (2-036-B-001) HF Alky Isostripper Reboiler	11.1	41.4	2.3	34.8	3.1

In addition, heat input to the HF Alky Isostripper Reboiler shall not exceed 95 mmBtu/hr. Each of these limits is based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3)]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H029 (2-036-B-002) HF Alky Hot Oil Heater	2.3	8.7	0.5	7.3	0.7

In addition, heat input to the HF Alky Hot Oil Heater shall not exceed 20 mmBtu/hr HHV. Each of these limits is based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3)]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H034 (2-103-B-001) LPVGO Hydrotreater Charge Heater	5.8	21.7	1.2	18.2	1.6
H035 (2-103-B-002) LPVGO Hydrotreater Charge Heater	5.8	21.7	1.2	18.2	1.6
H036 (2-103-B-003) LPVGO Hydrotreater Stripper Heater	6.5	24.1	1.3	20.2	1.8

In addition, heat input to the LPVGO Hydrotreater Charge Heaters shall not exceed 50 mmBtu/hr HHV, each heater, and heat input to the LPVGO Hydrotreater Stripper Reboiler shall not exceed 55 mmBtu/hr HHV. Each of these limits is based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-02-001 (Revision 3) and revised in V-05-089 R2]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H037 (2-104-B-001) HPVGO Hydrotreater Charge Heater	11.7	22.0	2.4	36.4	3.3
H038 (2-104-B-002) HPVGO Hydrotreater Charge Heater	11.7	22.0	2.4	36.4	3.3

In addition, heat input to the HPVGO Hydrotreater Charge Heaters shall not exceed 99 mmBtu/hr HHV, each heater, based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit C-91-051 (Revision 3) and Permit VF-02-001 (Revision 3)]

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H043 (2-121-B-001) DDS Reactor Charge Heater	7.1	11.5	1.5	22.3	2.0
H044 (2-121-B-002) DDS Reactor Charge Heater	7.1	11.5	1.5	22.3	2.0
H045 (2-121-B-003) DDS Reactor Stripper Reboiler	11.0	17.8	2.3	34.4	3.1

In addition, heat input to the Distillate Desulfurizer Reactor Charge Heaters shall not exceed 61 mmBtu/hr, each heater, and heat input to the Distillate Desulfurizer Stripper Reboiler shall not exceed 94 mmBtu/hr HHV. Each of these limits is based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit C-92-033 (Revision 2)]

Affected Units	Maximum Emissions (tons/yr)
H046 (1-044-B-001) CCR #2 Charge Heater H047 (1-044-B-002) CCR #2 No. 1 Interheater H048 (1-044-B-003) CCR #2 No. 2 Interheater H049 (1-044-B-004) CCR #2 No. 3 Interheater H050 (1-044-B-005) CCR #2 Reboiler	Total nitrogen oxides (NO <sub>x</sub> ) and sulfur dioxide (SO <sub>x</sub> ) emissions shall not equal or exceed 39 tons/yr



The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [Permit VF-04-001 and revised in V-05-089 R2].

Affected Units	Maximum Emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
H051 (2-122-B-001) KDS Charge Heater	7.65	14.24	1.57	23.91	2.16

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [VF-01-005].

Affected Units	Maximum Emissions (tons/yr)
	NO <sub>x</sub>
B014 (2-601-B-004) No. 4 Boiler	401

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [VF-02-001 (Revision 3)]

Affected Units	Maximum emissions (ton/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
FCCU (including Heat Recovery Units North and South and Number 5 Package Boiler)	256.0	365.0	55.0	448.0	265.4

In addition, heat input to each of these heat recovery units shall not exceed 431 mmBtu/hr (HHV), based on a 365-day rolling average, and heat input to the Number 5, 13, 14, 15 Package Boilers shall not exceed 249 mmBtu/hr (HHV), based on a 365-day rolling average.

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, PSD as follows: [VF-02-001 (Revision 3)]

Affected Units	Maximum emissions (tons/yr)				
	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>
No. 1 SRU Thermal Oxidizer	323.0	25.0	1.4	21.0	2.0
No. 2 SRU Thermal Oxidizer					

In addition, sulfur production shall not exceed 628 long tons per day, based on a 365-day rolling average. Also, heat input to each thermal oxidizer shall not exceed 28.6 mmBtu/hr (HHV) based on 365-day rolling average. [State-only Requirements from VF-02-001 (Revision 3)]

<b>Emission Unit</b>	<b>Refinery ID</b>
T081	1-6-T-81
T152	1-6-T-152
T701	2-606-T-701
T702	2-606-T-702
T733	2-606-T-733
T734	2-606-T-734
T783	2-606-T-783
T821	2-606-T-821
T845	2-606-T-845
T855	2-606-T-855
T856	2-606-T-856
T910	2-606-T-910

The source has elected to accept permit conditions to preclude the applicability of 401 KAR 51:017, Prevention of Significant Deterioration as follows: VOC emissions from the above storage vessels shall not exceed 51.9 tons per year, excluding emissions from equipment leaks, and based on a 12-month rolling sum, calculated monthly. [Permit VF-02-001 (Revision 3)]

Storage Tank # 911, 912, 913, and 920 were included in permit VF-02-001 (Revision 3) as part of a synthetic minor to avoid PSD for VOC, and were never constructed. The time limitation of construction have expired.

Pursuant to 40 CFR 63:021 (requirements from permit O-93-016 general condition 20), emissions of the following toxic air pollutants shall not exceed the limits listed below:

Cumene	57.1 lbs/hr	8 hour ave.
Xylene	97.2 lbs/hr	8 hour ave.
Toluene	58.9 lbs/hr	8 hour ave.
1,3 Butadiene	26.1 lbs/hr	8 hour ave.
Trimethylbenzene	156.4 lbs/hr	8 hour ave.
Naphthalene	69.4 lbs/hr	8 hour ave.
Methylene chloride	138.2 lbs/hr	8 hour ave.
Methyl ethyl ketone	720.8 lbs/hr	8 hour ave.
Nonane	306.6 lbs/hr	8 hour ave.
Methanol	37.3 lbs/hr	8 hour ave.
n-Hexane	235.4 lbs/hr	8 hour ave.

Furfural	1.8 lbs/hr 8 hour ave.
Chrysene	0.0059 lb/hr BACT

**OPERATIONAL FLEXIBILITY:**

FCCU feed Hydro-treaters (HPVGO, LPVGO) Outage Plan:

Pursuant to the US EPA Consent Decree, during periods of hydro-treater outage, the permittee can elect to comply with the short-term SO<sub>2</sub> limits or alternatively with actions included in the approved Hydro-treater Outage Plan.

Pursuant to the US EPA Consent Decree, during periods of hydro-treater outage, the permittee can elect to comply with the short-term NO<sub>x</sub> limits or alternatively with actions included in the approved Hydro-treater Outage Plan.

SRU Sulfur Shedding Plan:

Sulfur shedding plan will be followed as necessary when both SRU#1 and SRU#2 are inoperable. The plan shall be undertaken in the sequence necessary to achieve compliance as expeditiously as practicable.